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BOTANICAL ASPECTS OF JAMAICA.

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On May 27, 1897, in company with Prof. D. T. MacDougal, the writer sailed from Boston for Jamaica to make an inspection of the island, for the purpose of determining its availability for the location of a tropical station for botanical research.

The voyage was neither eventful nor, the first part at least, pleasant, as a cold rain prevailed much of the time, making a stay on deck impossible, except at the expense of a thorough drenching. About the fourth day out it grew warmer, and the bright blue of the water, with great masses of floating gulf weed, announced our approach to the tropics. On the fifth day land was sighted, — Watling's Island, or, as we knew it in our histories, San Salvador. Gazing at the low shore line, with its white lighthouse, we tried to imagine the sensations of Columbus when he first saw this outpost of the American Continent. The next morning we were rounding the barren shores of southeastern Cuba, and coasted the southern shores of that island nearly all day. We had now left the chilly air and dark waters of the North Atlantic and were enjoying genuine tropical weather. The vivid blue waters of the Caribbean Sea and the hot sunshine spoke eloquently enough of low latitudes.

The sun set before we came in sight of Jamaica, and it was past midnight when the light of Port Antonio could be distinguished. Although it was intensely dark, the land breeze, bearing indescribable scents of the land, and the chirping and buzzing of innumerable insects told us we were near *terra firma*.

As soon as we could have our baggage passed through the custom-house we drove at once to the hotel, where the comfortable beds and spacious rooms were very welcome after the confined quarters on shipboard. On awakening the next morning our eyes were greeted with the sight of cocoa palms, breadfruit trees, bananas, and other evidences of the tropics.

The warm, humid atmosphere was not especially conducive to hard work, especially after the chilly air we had left behind us, and for a few days we contented ourselves with becoming acquainted with the immediate surroundings of the beautiful harbor of Port Antonio. This is the principal port of the northern side of the island, and is most beautifully situated within sight of the Blue Mountains, the highest range in Jamaica. The shore formation is largely coral, and the rocks are covered with luxuriant vegetation to the water's edge. The heavy rainfall — about one hundred and fifty inches annually — induces a marvelously rapid growth of all kinds of plants, and everything is fairly buried in the rank growth. Along the coast cocoanut palms abound, and where the shores are muddy mangrove swamps are a conspicuous feature.

Although most of the country about Port Antonio is under cultivation, cocoanut and banana plantations predominating, still the native vegetation quickly takes possession of the neglected lands, and roadsides and hills furnish abundant and interesting material for the botanical collector. Among the most unfamiliar plants to Northern eyes are the climbing aroids, Philodendron and Syngonium, which, with their terrestrial relatives, Alocasia, Dieffenbachia, and other less common forms, contribute much to the tropical aspect of the prevailing vegetation. The sensitive plant is a common weed, and showy Thunbergias and other creepers abound. Of the ferns the most noticeable forms were a very common Anemia, and at slight elevations Gleichenia and a very beautiful Lygodium. Various Alsophilas and other tree ferns were not uncommon, but not nearly so fine as those at higher altitudes. A climbing Davallia, with prickly stems, was also conspicuous.

A railroad now connects Port Antonio with Kingston, which lies upon the southern shore of the island. The trip over this road is a most enjoyable one, as it traverses some of the most picturesque parts of the island and gives an excellent idea of its general topography and vegetation. For about thirty miles the road skirts the seashore, showing in places sandy beaches, but more commonly coral rock coming down to the water, carved into fantastic shapes by the action of the waves.

Along the sandy beaches *Ipomoea pes-caprae* abounds, and with this the curious "shore grape," Coccoloba, and other characteristic forms are common. In many places are depressions just back of the shore, and these form swampy jungles, with the trees laden with a perfect tangle of lianas and other epiphytic growths. Here and there in the more open places are groups of prickly stemmed "groo-groo" palms (Acrocomia), — the first indigenous palms we had seen.

Leaving the shore, the road passes over the mountains and part of the time is in sight of the forest, although for the most part the land along the route of the railroad is under cultivation. As we ascend the tree ferns become common, and a number of beautiful palms are noticed, among them the superb cabbage palm, *Oreodoxa oleracea*, with its slender, straight shaft shooting up sometimes a hundred feet and more. Gigantic bamboos cover the hillsides and grow in great masses along the streams, their exquisite green plumes being among the most beautiful of vegetable growths. This magnificent plant has been introduced probably from India, but is now thoroughly naturalized all over Jamaica.

As the summit is passed and the descent toward the southern side of the island begins, a difference in the character of the vegetation soon becomes apparent, and the very much diminished rainfall on this side of the island is at once indicated by the very different plants met with. This becomes more and more marked as Kingston is approached. Leguminous trees, Prosopis, logwood (Hæmatoxylon), Pithecolobium, characteristic of a drier region, are common, and several Cacti, Opuntias, and species of Cereus give a very distinct stamp to the landscape. The contrast between the semi-arid country about Kingston and the rank luxuriance of the vegetation at Port Antonio is most striking.

At Kingston we were met by Mr. Fawcett, the director of the public gardens of the island, who throughout our stay did everything possible to aid us in our work. Had it not been for his kindness it would have been quite impossible for us to have made our trip as successful as it was.

While in Kingston we were entertained at Mr. Fawcett's charming home in the Hope Gardens, about six miles from the town. This garden is comparatively new, but is becoming rapidly a most beautiful and interesting experimental station. Extensive plantings are being made which will add greatly to its attractiveness and usefulness.

The first trip made by us was to Castleton, the seat of the most interesting of the botanical gardens of Jamaica. We drove from Kingston, about nineteen miles, over a most picturesque road, the vegetation becoming more and more luxuriant as we approached the garden, where there is an average rainfall of about one hundred inches. A few hours only were spent at this time at Castleton, but later Professor MacDougal and myself returned for a stay of several days, during which we became better acquainted with the many attractions of this most beautiful garden. It is situated at an elevation of about six hundred feet, and contains a remarkable collection of palms and other tropical plants. Of the former there are about one hundred and fifty species, and among the other notable plants was a fine collection of cycads, comprising many magnificent specimens, which appear to thrive to perfection; screw pines, tree ferns, and many pretty epiphytic orchids, as well as innumerable showy flowering trees and shrubs, made the finest display we encountered anywhere. Of the flowering trees *Amherstia nobilis*, with its hanging clusters of gorgeous scarlet flowers, was, perhaps, the most beautiful; but among other showy trees were noticed a Lagerstrœmia, with big, lilac-colored flowers, and a Spathodea, whose flame-colored cups and deep green leaves formed a magnificent spectacle.

The country all about is very mountainous, and a trip to the higher regions yielded a number of most interesting ferns and liverworts, as well as many flowering plants not found on the lower levels.

A trip was made later to Blue Mountain Peak, the highest point in the island, rising over seven thousand feet above sea level. This excursion, which was taken in company with Mr. Fawcett, was in all respects a most enjoyable one. The trip was made from Kingston, and after the first nine miles was done on horseback, as the mountain roads are not available for vehicles. The native ponies are very sure-footed, however, and the trip offers no hardships, and more than repays one, both scenically and botanically, for the trouble. The scenery is of the most magnificent character, with fine views in all directions. This is the principal coffee-growing district, and on all sides were extensive plantations, many of them very old. Here and there were the works for storing and curing the berry, great heaps of which could be seen in places spread out upon the concrete platforms, "barbecues," to dry in the sun.

We visited the Hill gardens, "Cinchona," where there are plantations of cinchona trees, whose cultivation, however, no longer is profitable. Most of the plantation lies about five thousand feet high, and here the conditions are favorable for the growth of many subtropical and temperate plants, as the temperature is never extreme.

In the neighborhood of Cinchona were found the finest collecting grounds for ferns met with anywhere. In the shady, moist ravines there was a profusion of fern growths far exceeding anything I have ever seen. The tree ferns, various species of Alsophila and Cyathea, were magnificent; some of them could scarcely have been less than forty feet in height, their graceful, slender trunks crowned with the exquisitely cut leaves looking like the finest lace overhead against the sky. The undergrowth was largely composed of a bewildering variety of ferns, from big Marattias and Alsophilas, with leaves ten or fifteen feet long, to tiny Hymenophyllums, looking more like delicate mosses than ferns. Other interesting plants were Danæa, several species of Gleichenia and Davallia, and many fine liverworts and mosses. A rather unexpected find was a Sphagnum, which occurred in large beds along the roadside in one place. The occurrence of Sphagnum, as well as other Northern plants, such as *Lycopodium clavatum*, *L. complanatum*, *Fragaria vesca*, blackberries, and buttercups, mixed with beautiful pink begonias, Gleichenia, and other tropical types, showed the meeting of the Alpine and lowland floras.

The ride from Cinchona to the summit, about two thousand feet above it, did not reveal any very marked differences in the plants encountered, although at the summit itself the trees were somewhat dwarfed. Among the most characteristic trees of the higher altitudes was a Vaccinium, *V. meridionale* Sw., and *Podocarpus coriaceus* Rich. Tree ferns abounded, but were not so fine as those somewhat lower down.

From the peak fine views may be had in clear weather in both directions. On the north is the harbor of Port Antonio, and on the south that of Kingston. We did not enjoy the fine view very long, as a shower of rain came up which obliged us to descend sooner than we had expected, but not before we had time to get a good idea of the vegetation.

A most enjoyable trip was one made by the writer in company with the late Dr. Humphrey, in whose untimely death in Jamaica, shortly after our departure, botany has suffered so severe a loss. This trip was over the mountains from Port Antonio to Bath, the site of the first botanic garden established in Jamaica some hundred years ago, but now reduced to a fraction of its original area. It still contains some fine specimen trees, especially palms and Pandanus, but there are a number of other fine trees still remaining. The road over the mountains is a rough bridle path, which at the Cuna-Cuna pass reaches an altitude of about three thousand feet. It is proposed to make a carriage road, which will be, when complete, one of the most beautiful in Jamaica, as it passes through a most picturesque region, including the finest forests we saw anywhere. The whole district is one of very heavy rainfall and the vegetation wonderfully varied and beautiful. The road over the pass is through virgin forest of the most luxuriant description. Ferns in great variety abound, and in some places thickets of beautiful palms, *Euterpe oleracea*, formed a striking feature of the forest. These palms, with the tree ferns, large aroids, and epiphytic Bromeliads and orchids gave a thoroughly tropical aspect to the vegetation. There were numerous epiphytic orchids, but only a few in flower. Of these a yellow and brown Oncidium was most conspicuous, the great hanging panicles of flowers looking like a swarm of small butterflies. A great variety of showy Scitamineæ, Heliconia, Hedychium, Canna, and others were common, and among the lower plants were several tropical liverworts, among them Dendroceros, Symphyogyna, and Monoclea.

The little town of Bath lies close to the base of the mountains, and, besides its ancient garden, is famed for its hot mineral baths. The town was formerly much more important than at present, and there are still some of the fine old trees left, planted by a former generation. Among these are grand specimens of the stately *Oreodoxa oleracea,* the finest of all the Jamaica palms. This tree, with its smooth, slender shaft a hundred feet in height and its crown of green plumes, is indeed one of the most beautiful of plants.

As may be gathered from the foregoing sketch, the flora of Jamaica is extraordinarily rich and varied. The presence of high, abrupt mountains results in extremely different conditions both of temperature and moisture, and this is evident in the very divergent character of the plants of the different sections of the island. As we have seen, the prevailing vegetation is distinctly tropical, and, as might be expected, related to that of the Central and South American mainland. Considering the size of Jamaica the number of indigenous palms is surprising. Of the strictly American types of plants the Bromeliads are the most noticeable, although the Cacti, Agaves, and Yuccas are represented. The Bromeliads occur in nearly all parts of the island, and form an important factor in the rich epiphytic flora. One of the most characteristic sights is a large cotton tree (Eriodendron) with its great horizontal branches covered with a mass of epiphytes, conspicuous among which are many Tillandsias and other bromeliaceous forms.

Of orchids the island has about sixty species, many of them epiphytes, most of which are not especially showy. Besides the Oncidium already mentioned, there are pretty Epidendrums, and an exceedingly brilliant little crimson species, *Broughtonia sanguinea,* was common in several localities. Of the terrestrial orchids in flower the finest were two species of Bletia, recalling our own Calopogon, and a magnificent Phajus, which is said to have been introduced from Asia.

The aroids are among the noticeable plants, many striking species being common. Several species of Philodendron are exceedingly abundant, climbing high up the trunks of trees or clambering over rocks; Syngonium, closely resembling Philodendron, is also abundant, and species of Anthurium, Dieffenbachia, and other genera abound in the more moist localities. The floating *Pistia stratiotes* is a common inhabitant of ponds and quiet rivers.

Several species of Cacti are common, especially in the drier parts, where one columnar Cereus is often used for fences. One great night-blooming species, *C. triangularis*, almost covered the trees in places. Two species of Rhipsalis were common at various places visited.

Other striking plants were the innumerable lianas, draping and almost smothering the trees. Some of these were leguminous climbers, others Convolvulaceæ, Vitaceæ, Thunbergias, Allamandas, and a great many which there was not time to identify. Some of the showiest flowers seen belonged to these creepers. Many other interesting plants were noted, but those cited are enough to give some idea of the tropical character of the flora.

All the ordinary cultivated plants of the tropics grow with very little care, and many have become practically spontaneous. Fruit-growing has assumed great importance of late, and is becoming yearly more and more important.

Except the ferns and liverworts no very careful studies were made on the lower plants. Probably no region of equal extent in the world is richer in ferns than Jamaica. About five hundred species have already been described, and there are probably many more to be discovered, as very little collecting has been done in the more inaccessible parts of the island. The ferns comprise all the tropical types, the Hymenophyllaceæ alone being represented by some fifty species. The Cyatheaceæ include the tree ferns, Cyathea, Alsophila, Hemitelia, which are numerous and of very large size and wonderful beauty. Of the Marattiaceæ, *Marattia alata* and several Danæas are not uncommon in the higher mountains, and the Schizæaceæ comprise species of Schizæa, Lygodium, and Anemia. Gleichenias of several species are common and conspicuous ferns. The Ophioglossaceæ are scarce and none were encountered, although several species belong to the island. Of the heterosporous ferns the only one met with was *Marsilia polycarpa.*

Several species of Selaginella and Lycopodium were common, and *Psilotum triquetrum* was encountered once, but is evidently rare.

The liverworts are comparatively scarce at the lower levels, but amazingly abundant and varied in the higher altitudes, where the ferns also reach their maximum development.

Algæ were less abundant than had been expected, and lack of time did not permit a careful study of this group. Owing to the very slight tide — only about one foot — very little collecting can be done from the shore, and we were not provided with apparatus for collecting in deep water. The most interesting forms noted were the marine Siphoneæ, Caulerpa, Halimeda, and others. Probably this group is well represented and would repay careful study. Fungi also were less abundant than might have been anticipated.

In considering the localities best fitted for the establishment of a laboratory, there is little question that the eastern part of the island offers much the best conditions, as here there is the maximum rainfall with the resulting luxuriant vegetation. Port Antonio, lying on the coast and being very accessible, as well as offering excellent living accommodations, is in many respects a favorable locality, but is rather too far from the higher altitudes and virgin forest. Bath is nearer to the latter and is fairly easy of access, but is seven miles inland.

The writer cannot close this sketch without acknowledging the many kindnesses shown us on our trip by every one with whom we came in contact. Through the courtesy of the director of the island railways, Mr. McKinnon, we were provided with passes over all the lines, and were also offered other help which lack of time prevented our accepting. The governor of Jamaica, Sir Henry Blake, and the authorities of the Institute of Jamaica also showed great interest in our plans and helped us in many ways. It is to Mr. W. Fawcett, however, that we are especially indebted, and to whom much of the success of our trip is due.